



# An Investigation about Linguistic Aspects of Scientific Papers in Natural Sciences

Islam Qanbarov

Department of English Language Teaching, Faculty Humanities, Tajikistan State University, Tajikistan

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## Abstract

This study investigated the distribution of interactional metadiscourse markers (IMMs) across four disciplines of English research articles (RAs), namely Applied Linguistics, Psychology (labeled *soft* disciplines), Chemistry and Medicine (labeled *hard* disciplines), in order to spot any probable differences between the Introduction (Int) and Result/Discussion (RD) sections of those RAs. At first, a total of 120 RAs were selected (30 articles for each discipline). The Int and RD sections were extracted and then were compared as to their use of IMMs using Hyland's (2005) model.

During the corpus analysis, the IMMs were manually and carefully counted by the researcher and then by a second rater. The obtained results were averaged out to yield one more reliable set of data. The frequencies obtained per 1,000 words and then the Chi-square test was run. The results of statistical analysis showed that there was no significant difference between soft and hard disciplines in the employment of IMMs throughout the whole corpus when subsections were compared.

On the whole, this study suggests that IMMs are valuable rhetorical means which are believed not only to help writers to write better but also to facilitate the reading process for readers.

**Keywords:** Discourse Analysis; Metadiscourse; Metadiscourse Marker; Interactional Metadiscourse; Research Articles

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## 1. Introduction

In recent years there has been a growing interest in the interactive and rhetorical character of academic writing, expanding the focus of study beyond the ideational dimension of texts, or how they characterize the world. Such a view argues that academic writers do not simply produce texts that plausibly represent an external reality, but use language to offer a credible representation of themselves and their work, and to acknowledge and negotiate social relationships with readers.

Language used in writing, like that used in oral communication, serves three functions— ideational, interpersonal, and textual [1]. To fulfill the interpersonal and textual functions, *metadiscourse* is the only device which includes those linguistic materials which do not add to propositional content but signal the presence of the author [2].

Hyland and Tse (2004) believe that writing is viewed as an engagement between writer and reader which possess a social and communicative basis; and metadiscourse is related to the ways writers project themselves into their discourse to signal their attitude towards both the content and the audience of the text [3].

Metadiscourse is recognized as an important means of facilitating communication, supporting a writer's position, and building a relationship with an audience. Its significance lies in the role it plays in explicating a context for interpretation. Yet despite this importance surprisingly little is known about the ways it is realized in different disciplines and genres in which writers participate. So this study seeks to address this gap.

The present study, therefore, was based on a corpus of 120 Introductions (Int) and Results/Discussion (RD) sections of English research articles in the four

disciplines, Applied Linguistics (AL), Psychology (Psy), Chemistry (Chem), and Medicine (Med), with the aim of discussing the importance, frequency, and realizations of interactional metadiscourse in English research articles, using Hyland's (2005) model [4]. Int and RD sections of the articles were compared as to their use of interactional metadiscourse and their frequency were calculated per 1,000 words. In sum, this study addresses the following research questions:

R1. Is there any difference between Int sections of RAs written in Natural Sciences and those written in Social Sciences in the use of interactional metadiscourse markers?

R2. Is there any difference between RD sections of RAs written in Natural Sciences and those written in Social Sciences in terms of interactional metadiscourse markers?

Accordingly, the following null-hypotheses are formulated for the above-mentioned research questions:

H<sub>0</sub>1. There is no difference between Int sections of RAs written in Natural Sciences and Social Sciences in the use of interactional metadiscourse markers.

H<sub>0</sub>2. There is no difference between RD sections of RAs written in Natural Sciences and Social Sciences in terms of interactional metadiscourse markers.

## 1.2. Metadiscourse

In the early 1990s, linguists began to react against the strong emphasis on propositional meaning in text analysis. Introduction of metadiscourse into applied linguistics vocabulary in the 1980s, building on sociolinguistic conceptions of planes of discourse, frames, alignment and meta-talk, was largely a reaction to this overemphasis on the propositional aspects of language and an attempt to establish the important principle that language use always draws on, and creates for itself, a social and communicative dimension.

This movement resulted in a range of new perspectives on text, among which, studies of metadiscourse gained prominence. With the growth of discourse analysis as a key tool in understanding language use, the importance of interaction in writing as much as in speech has become ever more obvious, and metadiscourse has emerged as a way of bringing these interactional features to prominence.

The word "metadiscourse" was first coined by Zelling S. Harris in 1959 to offer a way of understanding language in use, representing a writer's or speaker's attempt to guide a receiver's perception of a text and to describe text elements which comment about the main information of a text, but which themselves contain only inessential information. Later, it was adopted in discourse

studies in the mid of 1980s by some scholars (Crismore, 1989; Vande Kopple, 1985; Williams, 1981) who were interested in writing instruction [2,5-6].

The term metadiscourse—also called metatext or metalanguage—is generally, defined as "text about text, or discourse about discourse" [7]. Metadiscourse has been also defined as "the cover term for the self-reflective expressions used to negotiate interactional meanings in a text, assisting the writer (or speaker) to express a viewpoint and engage with readers as members of a particular community" [8].

### 1.2.1. Metadiscourse models

Some of the major metadiscourse taxonomies that have developed in the metadiscourse literature are as follows: Vande Kopple (1985), Crismore et al. (1993) [9], Hyland (2005), Ädel (2006) and Abdi et al. (2010) [2, 8-10].

The first comprehensive functional classification of metadiscourse was introduced by Vande Kopple (1985) [2]. He suggested two main categories for metadiscourse: *textual* and *interpersonal*. Textual metadiscourse serves the function of organizing the text and directing the reader and fulfils Halliday's textual function. Interpersonal metadiscourse is employed to develop the relationship between the reader and the writer and add the writer's personal belief and degree of commitment toward an ongoing proposition [12].

The most substantial revisions have been those of Crismore et al. (1993) and Hyland (1998b, 1998c, 1999b) who have collapsed, separated and reorganized Vande Kopple's (1985) categories [2,9,13-15]. In Crismore et al.'s model two categories of *textual markers* and *interpretive markers* are supposed to account for the textual role of metadiscourse, with textual markers referring to features which help organize the discourse and interpretive markers which function to help readers interpret and better understand the writer's meaning and writing strategies.

Hyland (2005) developed a taxonomy which is summarized in table 1. His model is based on a functional approach which regards metadiscourse as the ways writers refer to the text, the writer or the reader. It is assumed that the rhetorical features of metadiscourse can be understood more clearly when they are used or identified in contexts in which they occur. His model acknowledges the contextual specificity of metadiscourse and, at a finer degree of delicacy, employs Thompson and Thetela's (1995) distinction between *interactive* and *interactional* resources to acknowledge the organizational and evaluative features of interaction [16].

*Interactive resources* allow the writer to manage the information flow to explicitly establish his or her

preferred interpretations. They are concerned with ways of organizing discourse to anticipate readers' knowledge and reflect the writer's assessment of what needs to be made explicit to constrain and guide what can be recovered from the text. Interactive resources consist of five categories: *Transition markers*, *Frame markers*, *Endophorics*, *Evidentials*, and *Code glosses*. Such investigation into interactive resources lies outside the scope of the present study.

*Interactional resources* focus on the participants of the interaction and seek to display the writer's persona and a tenor consistent with the norms of the disciplinary community. Metadiscourse here concerns the writer's efforts to control the level of personality in a text and establish a suitable relationship to his or her data, arguments, and audience, marking the degree of intimacy, the expression of attitude, the communication of commitments, and the extent of reader involvement. Interactional resources consist of five categories: *Hedges*, *Boosters*, *Attitude markers*, *Self-mentions*, and *Engagement markers*.

According to Hyland (2005, p. 156), five different features of interactional resources are important ways of situating academic arguments in the interactions of disciplinary communities [8]. They represent relatively conventional ways of making meaning and so elucidate a context for interpretation, showing how writers and readers make connections, through texts, to their disciplinary cultures.

Here only some examples of IMMs spotted in the corpus are mentioned. For convenience, they are

boldfaced in each example. The unnecessary parts of the selected sentences are omitted and the names of the relevant journals are given at the end of each sentence.

#### 1.2.1.1. Hedges

Hedges mark the writer's reluctance to present propositional information categorically. They are linguistic forms to indicate that evidence is not enough or is vague to support a hedgeless proposition (examples 1 & 2). They are sometimes scholarly guesses of the writer. Some scholars maintain that hedges are used to provide room for the audience, but it is always not the case [5,9].

- 1) may: Maternal smoking during pregnancy, **may** increase the probability of. *Journal of Anxiety Disorders*
- 2) generally: Women **generally** did not want care that. *Women and Birth*

#### 1.2.1.2. Boosters.

Boosters express certainty and emphasize the force of propositions (examples 3 & 4)

- 3) clearly: First of all, the number of the identified corpus sample metaphors is clearly lower (six items) than that of the textbook metaphors (16 items). English for Specific Purposes
- 4) actually: Indeed, the proportion of patients using appropriate chemoprophylaxis had actually declined, from 50.5% to 39.3% for travelers. *Travel Medicine and Infectious Disease*

Table 1. An Interpersonal Model of Metadiscourse [8]

Category	Function	Examples
Interactive	Help to guide the reader through the text	Resources
Transitions	express relations between main clauses	in addition; but; thus; and
Frame markers	refer to discourse acts, sequences, or stages	finally; to conclude; my purpose is
Endophoric markers	refer to information in other parts of the text	noted above; see Fig; in section 2
Evidentials	refer to information from other texts	according to X; Z states
Code glosses	elaborate propositional meanings	namely; e.g.; such as; in other words
Interactional	Involve the reader in the text	Resources
Hedges	withhold commitment and open dialogue	might; perhaps; possible; about
Boosters	emphasize certainty or close dialogue	in fact; definitely; it is clear that
Attitude markers	express writer's attitude to proposition	unfortunately; I agree; surprisingly
Self-mentions	explicit reference to author(s)	I; we; my; me; our
Engagement markers	explicitly build relationship with reader	consider; note; you can see that

### 1.2.1.3. Attitude markers

Attitude markers express the writer's appraisal of propositional information, conveying surprise, obligation, agreement, importance, and so on (examples 5 & 6).

- 5) unfortunately: **Unfortunately**, from our study, it is not appropriate to compare a drug with another concerning the number of ... *Seizure*
- 6) interestingly: **Interestingly**, in the framework, hydrogen bonding induced onedimensional assembly of water and... *Inorganica Chimica Acta*

### 1.2.1.4. Self-mentions

Self-mentions suggest the extent of author presence in terms of first person pronouns and possessives. They are used to linguistically project the writer from behind the written lines, presumably to remind readers that the lines are produced by a colleague (7 & 8).

- 7) the author: **The author** concluded from the results that in studying L2 motivation, both general and... *System*
- 8) we: **We** decided to study this system in detail. *European Polymer Journal*

### 1.2.1.5. Engagement markers

Engagement markers explicitly address readers, either by selectively focusing their attention or by including them as participants in the text through second person pronouns, imperatives, question forms and asides (examples 9 & 10).

- 9) suppose: Now **suppose**, instead, that words are not associated to positions, but order is represented by item-item associations. *Acta Psychologica*
- 10) note that: **Note that** IL-6 can have both proinflammatory and anti-inflammatory actions and Nutrition Research.

Ädel's (2006) model, shows a different theoretical view in that she separates evaluation from metadiscourse and questions non-propositionality as the criterion for metadiscourse [10].

A more recent model introduced by Abdi, Tavangar Rizi, and Tavakoli (2010), contains the maxims which help authors to appropriately take advantage of valuable metadiscursive resources [11]. The maxims (i.e., the explicit guidelines to materialize the Gricean Cooperative Principle) are supposed to be a logical driving force behind any decision made at metadiscourse level. This model, besides providing a framework for the use of metadiscourse markers, shows a different theoretical conceptualization of metadiscourse. Such a model could be assumed an improvement against coarse-grained holistic guides for the use of metadiscourse

offered by previous studies. The attempt also led to a new classification of metadiscourse and added two new metadiscourse strategies of collapsers and disclaimers.

It should be noted that Hyland's (2005) model and definition is preferred as a point of departure in this study. It was preferred for (a) being simple, clear, and inclusive, (b) building on previous taxonomies, and (c) lending itself more easily to our purpose [4].

## 2. Methodology

### 2.1. The corpus

The corpus of the study was composed of 120 Int and RD sections of English research articles written by scholars in AL, Psy, Chem, and Med (30 articles from each discipline). The study focused on two sections of research articles, namely Int, and RD. The purpose of selecting these two parts was that they are challenging parts of RAs [7]; they have determining roles in motivating studies. The function of Int section in RAs is to present the aim and scope of the study and to give some theoretical preliminaries [17], and RD section has the aim of persuading its readers. Persuasive text type is a better context for the realization of the interpersonal metadiscourse. In these sections due to different rhetorical functions, writers mainly establish the significance of the study and make generalization regarding the main findings. Another reason was the length of the articles and the fact that using only Int sections could not provide us with enough data and therefore was not suitable for the present study. For these reasons both parts were selected to be analyzed for the types and amounts of IMM used by the writers.

The articles which were electronically accessible collected from the net (the corpus detail and the full addresses of the articles appear in Appendix A).

This study only sought to examine the genre of research article for the following reasons. First, to obtain a more valid result in any contrastive study, identical genres should be examined. Second, the RA is an outstanding and widely used genre of communication among academia [18]. In this study the criteria for selecting RAs were as follows:

**a) Discipline:** The fields of Applied Linguistics, Psychology, Medicine, and Chemistry were chosen (30 articles from each discipline). The main motivation for selecting these four disciplines was to investigate representatives of the two major branches of science, the Social Sciences (SS) and the Natural Sciences (NS). In order to select the disciplines, Becher's (1989) taxonomy of the disciplines was used to decide on the corpus content [19]. Becher (1989) divides the academic disciplines into *soft* and *hard* fields which are often synonymous with the terms *social* and *natural* disciplines. He uses soft sciences to refer to the

Humanities and Social sciences. The soft and hard fields then further divided into *pure* and *applied* groupings. Very broadly, the pure fields can be more reflective and theoretical, while the applied fields are objective and practical. Accordingly, the present corpus consists of the four following disciplines:

- Hard-pure: Chemistry
- Hard-applied: Medicine
- Soft-pure: Psychology
- Soft-applied: Applied Linguistics

Moreover, from a traditional viewpoint, Psychology and Applied Linguistics are considered as sub-categories of Social Sciences, while Chemistry and Medicine are known to be among the branches of Natural Sciences.

Each discipline has its own theoretical framework from which it grounds its field. Moreover, some research evidence indicates that the disciplinary conventions significantly constrain writing style and that sometimes these conventions may have an even greater effect on the writer's choices than national cultures [20].

**b) Year of publication:** There is an assumption that time influences the style of the writers. In the definitions of genre by Coe (1998), Bazerman (1998) and Widdowson (1998), the time factor is very important because, as Miller (1998) pointed out, genres change, evolve, and decay [21-24]. To take care of the time factor, all research articles culled for this purpose were chosen from among articles published in 2009 and 2010.

**c) Format of research articles:** In order to gain homogeneous data, the researcher tried to choose those RAs which had experimental design (RAs in Med and Chem mainly deal with experimental research). It should be mentioned that all the disciplines investigated in this research, with slight variations, follow the standard format of RAs which go through major phases of Introduction, Method, and Result and Discussion. Therefore, the articles that did not follow this format were discarded and replaced by alternative ones.

## 2.2. Procedures

The methods used in this study were primarily comparative and corpus-based. The comparative method was used in order to identify differences in the use of IMMs in the four different academic disciplines. For this reason, two rhetorical sections of 120 RAs consisting of 332,724 words were analyzed. (the Int sections constituted 89,350

words and the RD sections constituted the rest, i.e., 243,374).

To determine the frequency of IMMs Hyland's (2005) taxonomy of metadiscourse, which appeared in table 1 in the previous section, was taken as the basic model. Several functions of each metadiscourse strategy and their possible formal realizations were recognized according to the model. In order to qualify an item as an metadiscourse, three key principles should be present.

- Metadiscourse is distinct from propositional aspects of discourse;
- The term metadiscourse refers to those aspects of the text that embody writer-reader interactions; and
- Metadiscourse distinguishes relations which are external to the text from those that are internal [3].

With very few exceptions, computer-assisted methods have not been used in research into metadiscourse. One thing that has discouraged researchers from using their computers is the fact that metadiscourse is a contextual phenomenon. Hyland (2004) explicitly states this: "Given the highly contextual nature of metadiscourse and the fact that a particular form can serve either a propositional or metadiscursive function, items were coded manually rather than by computer". So the analysis was conducted with rigorous consideration of the functional meaning and a particular attention was paid to the context in which IMMs were used.

First, all of the words used in the Int and RD sections of the selected RAs were counted. In counting the words, only the body part of each article has been included. This means that no sub-headings, footnotes, bibliographies, tables and figures were included. The words such as *example*, *table*, *figure*, and *equations* were also excluded. They are integral parts of the articles and according to Dahl (2004) [25], "... they may easily skew the results for this category, as one or a few articles may yield a very high total number of such items" (p. 1817). Then the selected parts were carefully read word by word in order to identify and locate the expressions of interactional metadiscourse. All cases were examined in context to ensure they were IMMs. Since the size of the research articles in each discipline and across two rhetorical sections varied, the frequency of IMMs was decided to be calculated per 1,000 words and all calculations were carried out on the adjusted data in order to ensure more validity.

Furthermore, since a single judgment was deemed to be inadequate for identifying IMMs, an MA student, who was familiar with metadiscourse

marking, reviewed the corpus and the results were averaged out to yield one more reliable set of data.

### 2.3. Data Analysis

In order to investigate the two research questions and null hypotheses of the study the raw data were transformed into the adjusted data following the procedures mentioned in the previous section. Since this study had the aim of investigating whether there was any statistically significant difference in the use of IMMs in the Int and RD sections of soft and hard disciplines, Chi-square was chosen as the appropriate nonparametric statistical device to test the hypotheses.

### 3. Results

The aim of this study was to investigate the occurrence of IMMs in the Int and RD sections of

soft and hard disciplines. After determining the frequency of IMMs in two sections of the selected research articles (first by the researcher and then by a second rater) and averaging out the obtained results, the total words used in each section were also counted. Since the size of the research articles in each discipline and across two rhetorical sections varied, the frequency of IMMs was calculated per 1,000 words. In this section, the distribution of IMMs in the Int and RD sections of two disciplines of soft and hard sciences is presented.

#### 3.1. Distribution of IMMs in the Int and RD Sections of Soft and Hard Disciplines

Table 2 presents the total number of words in Int and RD sections of soft and hard disciplines, total number of IMMs, and their total frequencies.

**Table 2.** frequencies of IMMs in the Int and RD Sections of Soft and Hard Disciplines

	Int		RD		Int+RD	
	Soft	Hard	Soft	Hard	Soft	Hard
<b>Total words</b>	59,096	30,254	129,465	113,909	188,561	144,163
<b>Total IMMs</b>	1,687	976	4,414	3,612	6,101	4,588
<b>F per 1,000</b>	28.54	32.26	34.09	31.70	32.35	31.82

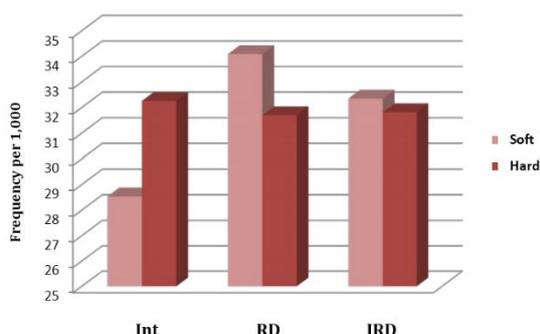
F: Frequency, Int: Introduction, IMMs: Interactional Metadiscourse Markers, IRD: Introduction and Results/Discussion, RD: Results/Discussion

**Table 3.** Chi-square Values of Comparing IMMs in the Int, RD, and IRD Sections of Soft and Hard Disciplines

	Int			RD			IRD		
	Chi-Square	df	Sig.	Chi-Square	df	Sig.	Chi-Square	df	Sig.
	0.148	1	0.701	0.061	1	0.806	0.000	1	1.000

Int: Introduction, IRD: Introduction and Results/Discussion, RD: Results/Discussion

According to frequency rate (table 2), 32.26 IMMs per 1,000 words are found in the Int section of hard sciences RAs whereas in the Int section of soft sciences RAs the rate is lower (see, also, figure 1).



**Figure 1.** Distribution of IMMs in the Int, RD, and IRD sections of soft and hard disciplines

Table 2 shows that 34.09 IMMs per 1,000 words are found in the RD section of soft sciences RAs whereas in the hard sciences RAs the rate is lower. Also, according to frequency rate, 32.35 IMMs per 1,000 words are found in the IRD section of soft sciences RAs whereas in the hard sciences RAs the rate is lower.

But by looking at the chi-square values (table 3) we can conclude that, there is no significant difference between Int, RD, and IRD sections of soft and hard sciences RAs in the use of IMMs. I also presented the distribution of IMMs in the Int, RD, and IRD sections of AL, Psy, Chem, and Med research articles in order to find out differences between them in the use of IMMs. Table 4 presents the total number of words in the Int, RD, and IRD sections of AL, Psy, Chem, and Med RAs, total number of IMMs in the four disciplines of AL, Psy, Chem, and Med research articles, and their total frequencies. According to

frequency rate, 33.82 IMMs per 1,000 words are found in the Int section of Medicine RAs whereas in

the AL, Psy, and Chem RAs the rate is lower (also see figure 2).

**Table 4.** Frequency of IMMs in the Int, RD, and IRD Sections of AL, Psy, Chem, and Med Research Articles

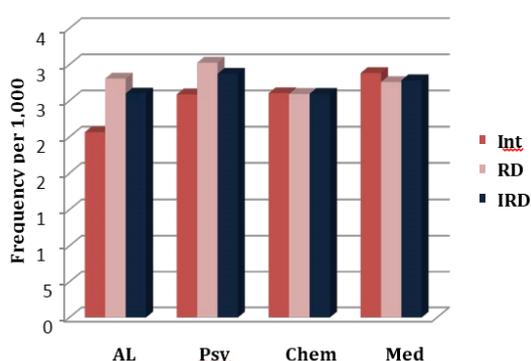
	Int				RD				IRD			
	AL	Psy	Chem	Med	AL	Psy	Chem	Med	AL	Psy	Chem	Med
Total words	26,285	32,811	16,979	13,275	68,182	61,283	60,071	53,838	94,467	94,094	77,050	67,113
Total IMMs	674	1,013	527	449	2,254	2,160	1,858	1,754	2,928	3,173	2,385	2,203
F per 1,000	25.64	30.87	31.03	33.82	33.05	35.24	30.93	32.57	30.99	33.72	30.95	32.82

AL: Applied Linguistics, Chem: Chemistry, F: Frequency, Int: Introduction, IMMs: Interactional Metadiscourse Markers IRD: Introduction and Results/Discussion, Med: Medicine, Psy: Psychology, RD: Results/Discussion

**Table 5.** Chi-square Values of Comparing IMMs in the Int, RD, and IRD Sections of AL, Psy, Chem, and Med Research Articles

Int			RD			IRD		
Chi-Square	df	Sig.	Chi-Square	df	Sig.	Chi-Square	df	Sig.
1.082	3	0.781	0.242	3	0.970	0.209	3	0.976

Int: Introduction, IRD: Introduction and Results/Discussion, RD: Results/Discussion



**Figure 2.** Distribution of IMMs in the Int, RD, and IRD sections of AL, Psy, Chem, and Med

This difference can be explained by resorting to nature of Medicine discipline. This discipline can be categorized under hard sciences in which the setting of the experiments is more controlled and the materials and procedures can be closely measured. However, soft sciences, such as Applied Linguistics do not have firm theoretical foundation and this tentative nature and subjective evaluation result from the conditions under which the research made are not fully in the control of researchers. According to Hyland (1998), in the soft fields, there is less control of variables and more diversity of research outcomes. This discipline may require more persuading resources such as IMMs to structure the text [13,14].

Table 4, also, presents the total frequencies of IMMs in the RD sections of AL, Psy, Chem, and Med RAs. According to frequency rate, 35.24 IMMs per 1,000 words are found in the RD section of Psychology

RAs whereas in the AL, Chem, and Med RAs the rate is lower. Also, table 4 shows that 33.72 IMMs per 1,000 words are found in the IRD section of psychology RAs where in the AL, Chem, and Med RAs the rate is lower.

But regarding the chi-square values (table 5) we can conclude that, there is no significant difference between Int, RD, and IRD sections of Applied Linguistics, Psychology, Chemistry, and Medicine RAs in the use of IMMs.

#### 4. Discussion and Conclusions

Interpersonal metadiscourse is an indicator of the attempts made by writers to create an interaction with their reader, reach their audience and express their own truth-value judgments about the ongoing proposition. The more interpersonal the nature of the metadiscourse used in a text, the more the writer of the text intends to achieve these goals and interactional metadiscourse markers are devices with a variety of functions and they are central to the coherence and organization of RAs.

This study sought to find out whether there were any differences in the employment of IMMs in the genre of RA between social (soft) and natural (hard) disciplines. The corpus of the study was composed of 120 Int and RD sections of English RAs written by scholars in AL, Psy, Chem, and Med (30 articles from each discipline). During the corpus analysis, the interactional metadiscourse markers were manually and carefully counted by the researcher and then by a second rater. The obtained results were averaged out to yield one more reliable set of data. The frequencies

obtained per 1,000 words and then the Chi-square test was run in order to test the hypotheses of this study.

There were two null-hypotheses to be investigated in this study. Regarding the first hypothesis, a rough look at the total frequency of IMMs in table 2 and the  $\chi^2$  value in table 3 (0.14) indicates that natural writers use IMMs in Int sections of RAs more frequently than social writers, but the difference is not significant. So the first hypothesis is proved. Looking at the total frequency of IMMs in table 2 and the  $\chi^2$  value in table 3 (0.61) indicates that social writers use IMMs in RD sections of RAs more frequently than natural writers, but the difference is not significant. So the second hypothesis is proved.

Although it is not in the scope of the present study but careful examination of the corpus of study shows that Hedges are the most frequently used strategies among other strategies, and social writers use Hedges more frequently than natural writers [3,15,26]. Also, Engagement markers are the less widely used ones in two sections of RAs.

Based on the results of the present study, the following conclusions can be drawn:

- There is no significant difference between Int sections of RAs written in Natural Sciences (Hard disciplines) and Social Sciences (Soft disciplines) in the use of interactional metadiscourse markers.
- There is no difference between RD sections of RAs written in Natural Sciences and Social Sciences in terms of interactional metadiscourse markers.

Although this study could not find significant differences in the use of IMMs in the genre of RAs, among soft and hard disciplines, but we cannot ignore its crucial role in mediating the relationship between what writers intend to argue and their discourse communities. Because of its frequent occurrence in writing, especially academic writing, this study aimed at increasing students' awareness of the way native speakers of English organize their writings. In the era of dialogue among civilizations, it should be kept in mind that as Yarmohammadi (2004) mentions, meaning comes from culture, and there is a mutual and indirect relationship between language and culture [27]. We cannot create an effective dialogue with people in other languages without having knowledge of the organization used in those languages. Metadiscourse provides part of this field of knowledge for us. Although Abdi (2002); Crismore and Vande Kopple (1990); Hyland, 1999, 2004, 2005 and some other scholars have carried out studies concerning metadiscourse, it is still a rather new concept to some teachers and researchers [8,15, 29].

#### 4.1. Implications of the Study

This study has pedagogical implications for writers, syllabus designers, teachers, and researchers. Previous studies have acknowledged the need for validated data concerning different strategies for teaching in specific contexts [12,30-31]. This study provides updated authentic data for writing classes. Provision of authentic materials for specific contexts plays an important role. On the other hand, Dudley-Evans (1994) and Paltridge (1996) believe that authentic materials for course design are derived from genre analysis [32,33]. The findings of this study should help to feed into the process of designing relevant and authentic course material.

In addition to this, metadiscourse offers teachers a useful way of assisting students towards control over disciplinary-sensitive writing practices. Because it shows how writers engage with their topic and their readers, exploration by students of metadiscourse in their own and published writing can offer useful assistance for learning about appropriate ways to convey attitude, mark structure, and engage with readers. Consciousness raising is crucial in L2 writing instruction and for teachers this means helping students to move beyond the conservative prescriptions of the style guides and into the rhetorical contexts of their disciplines, investigating the preferred patterns of expression in different communities. Students can be helped to read rhetorically and to reflect, perhaps through diaries, on the practices they observe and use themselves [34]. What, for example, is an author's purpose in using a personal pronoun here? Why has she chosen to summarize or explicitly mark a topic shift at this point? What is achieved by including a citation here?

When do writers typically express their doubt and certainty?

In sum, not everyone becomes a great writer; however, they can learn to write better and to write well organized and flowing essays with a clear language. Focusing on grammar and sentence structure alone is not the key to making better EFL/ESL student writers. Students must also be given what any writer needs: an understanding of their capacity to write, motivation, self-confidence and courage and instruction in knowledge about the appropriate use of metadiscourse as well as other rhetorical strategies.

There might be interference from native language when trying to communicate in English with other members of a discourse community. Such a concern required that metadiscourse is better advised to be explicitly taught in teaching how to write RAs. An understanding of the metadiscourse marking in English RAs could be an important contribution to language teaching if it could reveal the underlying mechanism that controls the use of metadiscourse. Such a mechanism could facilitate

teaching and learning since it is capable of shedding light on the nature of the decisions that motivate and control the use of metadiscourse. Lack of familiarity with these resources of academic discourse may cause difficulties for those students who want to be considered as a member of disciplinary community. The awareness of IMMs provides the opportunity for learners to meet the needs of audience. Therefore, it seems necessary to devote special attention to the teaching of these resources to the foreign language learners of English in the research or ESP courses. Our understanding of the IMMs also needs to be sharpened by doing further research in this area of rhetorical competence.

#### 4.2. Suggestions for Further Research

The following suggestions can be taken as the areas of further research in this study:

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